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PIUTE TROUT

Inyo National Forest

HABITAT MANAGEMENT PLAN

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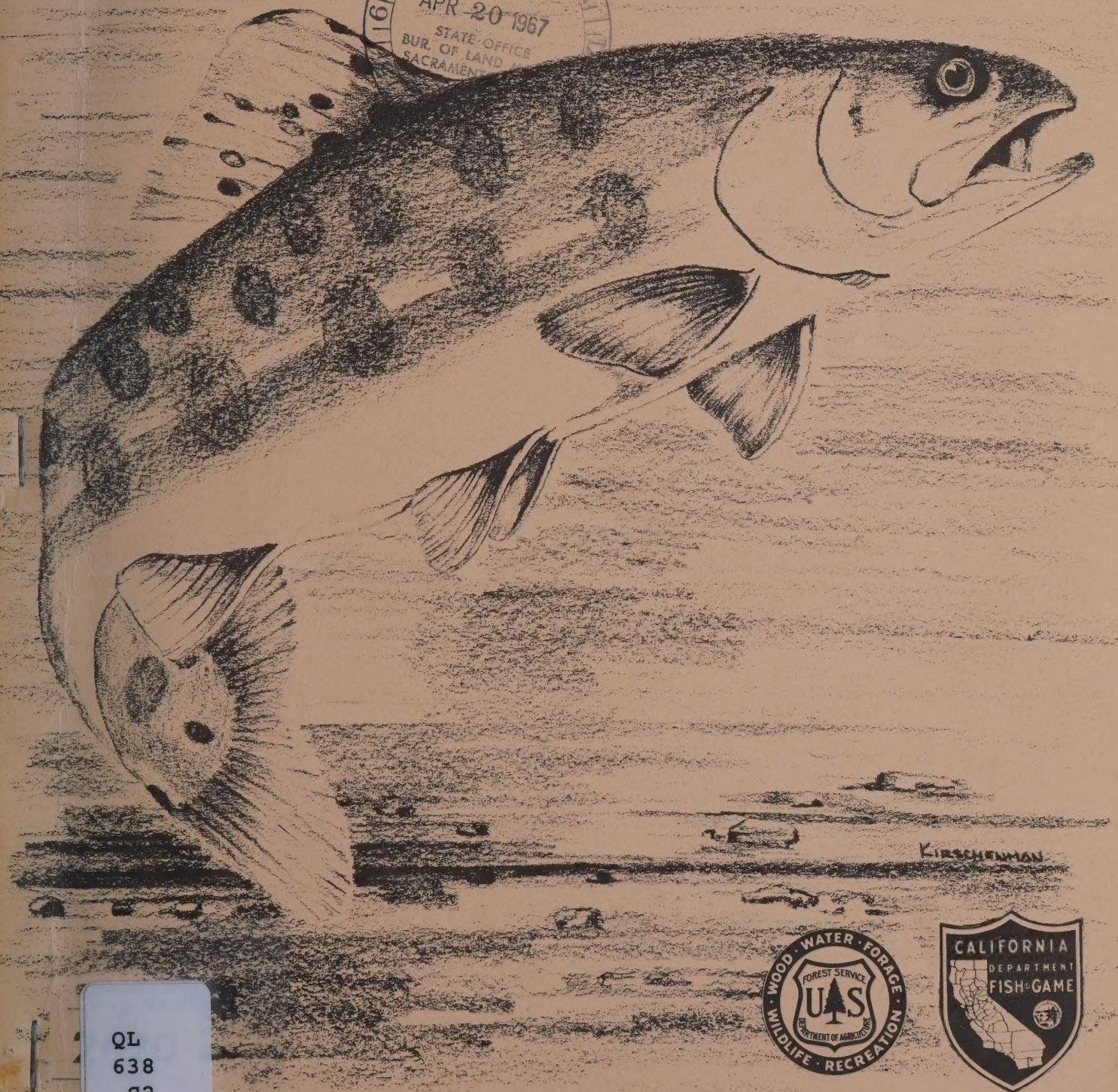

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PIUTE TROUT HABITAT MANAGEMENT PLAN

INYO NATIONAL FOREST

1967

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I. INTRODUCTION

A. GENERAL

The primary purpose of this plan is to evaluate the major habitat problems of the Piute cutthroat trout (Salmo clarkii seleniris) in Cottonwood Creek, White Mountains, Mono County on the Inyo National Forest. Other objectives are to:

1. Bring together factual information on the Piute trout and its habitat.

2. Increase the knowledge and interest of Forest Service personnel.

3. Provide guidelines for implementing a continuing habitat protection and improvement program.

The native habitat of the Piute trout is in the Silver King Creek drainage above Llewellyn Falls in Alpine County, California. The only successful transplant outside of the East Carson River system, was made in 1946 in Cottonwood Creek. Successfully raising hatchery fish is extremely difficult. Very little success has been achieved in establishing populations in new locations.

The Inyo National Forest contains one of the most diversified wildlife faunae of any forest in the National Forest system. Of the 29 different habitat types in California, 10 are found on this Forest. Examples of unique wildlife species are the Sierra Bighorn Sheep, Tule Elk, Golden Trout, and the Piute Trout. Our wildlife habitat management task is large, diversified, and unique.

B. IMPORTANCE

The Piute trout is one of the rarest and most delicately-hued salmonids in the United States (McAfee-1966). California fishermen and wildlife enthusiasts have little basic knowledge of, and are seldom acquainted with, this fish. This fact is regrettable from many viewpoints; understanding and appreciating the unusual in nature can be extremely interesting and enjoyable, and an informed public is essential to a successful management program.

The genetic character of the Piute trout may have great significance in the future. This fish is adapted to a specific habitat cline. At present the practical usefulness of this combination of features in man's scheme of things is not clear, but speciation is not a random or insignificant occurrence. The formation of new subspecies is an orderly, directed phenomenon of nature. The involved hereditary factors warrant preservation in their original form; once lost they are gone forever. Some biologists refer to new subspecies as "evolutionary clay."

The relationships between plants and animals are not simple situations. In most cases these relationships have developed over thousands of years. Many fish exhibit great variation in form and color throughout their range. These character gradients, or clines, are definitely associated with specific environmental gradients.

The Piute trout is a subspecies that evolved in the geographically isolated waters of upper Silver King Creek. It is an environmental modification of the Lahontan cutthroat trout (Salmo clarkii henshawi). The process of adapting to new environments is important as well as interesting in light of the knowledge that almost all varieties of life, plants, mammals, fish, and insects, have evolved by this process. Not all survive to become established species. However, those that have been selected are of great value.

There are some 20,000 species of fish recognized worldwide by biologists. This is a small number when compared with 70,000 forms of insects and 232,000 invertebrates, but much higher than 8,600 birds, 6,000 reptiles, 5,000 mammals and 1,500 amphibians. However, animal groups that contain large numbers of species are more specifically oriented, and have the flexibility to accept different environments.

The Piute trout is listed as a rare and endangered wildlife species by the U.S. Fish and Wildlife Service and the California Department of Fish and Game. The Fish and Wildlife Service announced in 1964 that it was accelerating a program to save near-extinct wildlife species in the United States. A special scientific team has been named to conduct an intensive study aimed at preserving endangered forms. The Survival or Surrender program lists the Piute trout as an endangered wildlife species. The U.S. Fish and Wildlife Service considers a species "rare" when its numbers are small but its survival is not in jeopardy in the foreseeable future. When survival is seriously threatened, it is "endangered." The California Department of Fish and Game's "California Fish and Wildlife Plan," written in 1966, lists as endangered wildlife species: Sea Otter, California Condor, Bald Eagle, Peregrine Falcon, and the Piute Trout. Walter T. Shannon, Director of the Department, stated: "The key to the preservation, maintenance, or enhancement of a fish and wildlife species is directly dependent on the condition and extent of its habitat."

The "Endangered Wildlife Species Bill" (Public Law 89-669 H.R. 9424) became law on October 15, 1966. The National Forests are directed to preserve the habitats of all threatened wildlife species.

The quality of fishery habitat is directly related to the condition of the watershed. The understanding and preservation of watersheds is basic to successful fishery habitat management. The

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better watershed management job we do, the better our fishery habitat management job will be. This integrated principle will be fundamental under our multiple use concept approach to Piute trout management on the Inyo.

C. RARE AND ENDANGERED SPECIES MANAGEMENT PROGRAM

In general, the following program is suggested to properly protect rare and endangered wildlife:

1. The first priority of multiple use management should be directed towards the rare and endangered wildlife species.

2. Establish the particular species in as many locations and different habitat conditions as possible. Placing "all our eggs in one basket" can be a dangerous policy.

3. Continuing close surveillance will be given by frequent observations and inspections of both the species and the habitat. Outside experts may provide valuable assistance in this part of the program.

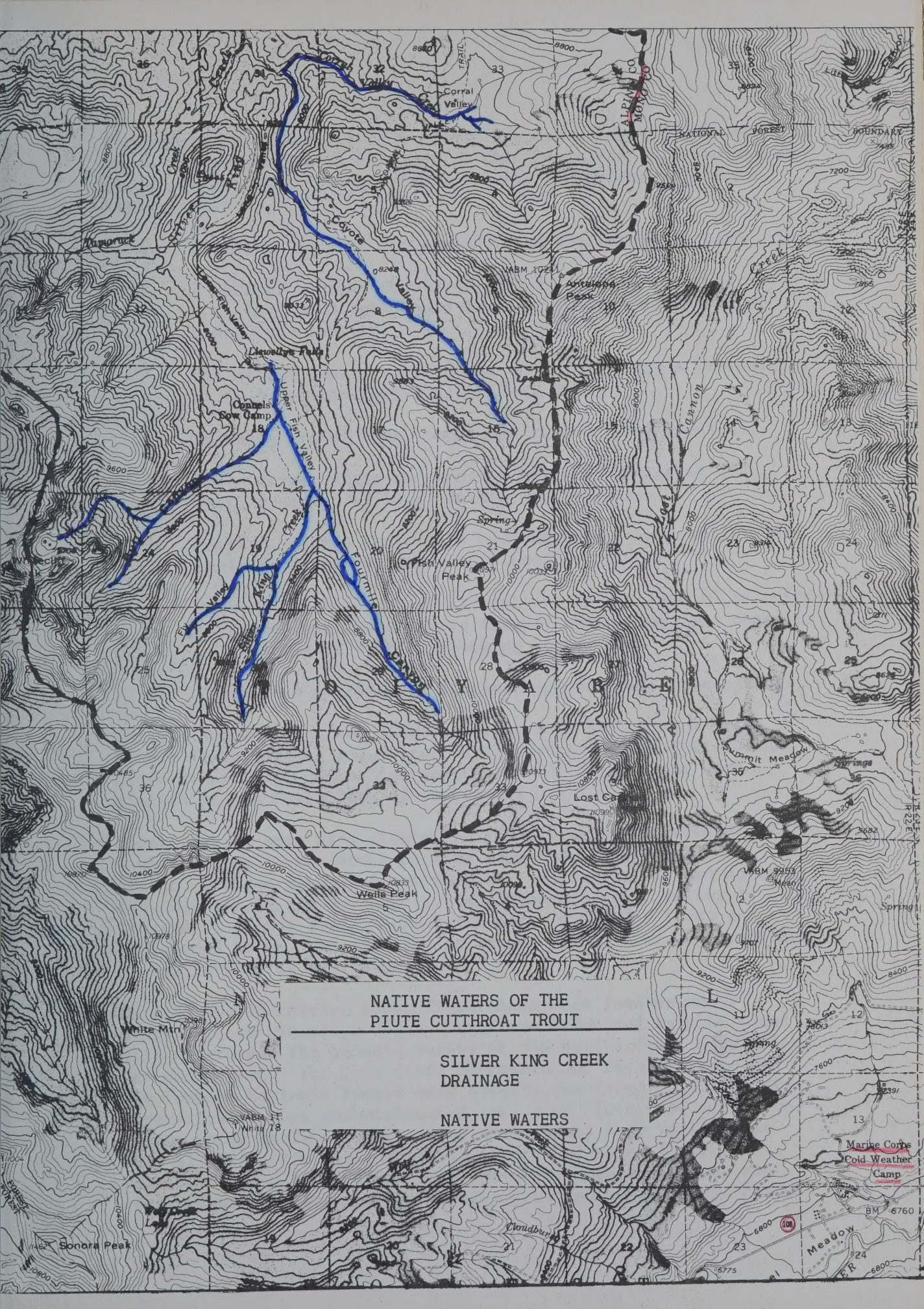
4. Cooperation with the California Fish and Game in establishment of sanctuaries or refuges with adequate enforcement will be sought.

5. Initiation of a dynamic public information program aimed at creating understanding and support will be essential for full success.

D. HISTORY OF THE PIUTE TROUT

The Piute trout was first described by J. O. Snyder in 1933, who collected specimens in their native streams in Alpine County. The native range included only Silver King Creek drainage above Llewellyn Falls, east of the Sierra Nevada. Specifically this extended from Llewellyn Falls upstream to include the major tributary streams of Fly Valley Creek, Four-Mile Creek, and Bull Canyon Creek. In recent years Piutes have been introduced into Coyote Valley and Corral Valley Creeks (tributaries to Silver King Creek below Llewellyn Falls) above impassable falls in each stream. Plants were also made in Bull Lake on the Wolf Creek drainage of the East Fork of the Carson River in Alpine County. All of these transplants in the native range are believed to be successful.

A serious decline was noted in 1945 and prompted the California Fish and Game to search for a suitable transplant location and establish new populations. At the April 1946 meeting of the Eastern Sierra Packers Association in Independence, White Mountain District Ranger Al Noren suggested the Upper Cottonwood Creek Basin in the White Mountains. On July 3, 1946, District Fisheries


NATIVE WATERS OF THE
PIUTE CUTTHROAT TROUT
SILVER KING CREEK
DRAINAGE
NATIVE WATERS
Corral Valley
Coyote Valley
Tamarack
Lake
Llewellyn Falls
Upper Fish Valley
Connels Cow Camp
Fish Valley Peak
Fourmile Canyon
Antelope Peak
Summit Meadow
Lost Cabin
Wells Peak
White Mtn
Sonora Peak
Marine Corps Cold Weather Camp
Meadow
Spring
Creek
Trail
Pass
Canyon
Valley
Peak
Meadow
Springs
Cloudburst
ALPINE CO
MONO CO
NATIONAL FOREST BOUNDARY
T 8 N
R 23 E
R 24 E

Biologist, Eldon Vestal, Jack Fraser, Warden Crocker and Ranger Noren surveyed the area and came to the conclusion that the stream would support Piute trout. The following conditions were found (Vestal-1946):

1. The North Fork of Cottonwood Creek was barren of fish life.

2. A natural barrier about one-half mile above the junction with the South Fork would prevent upstream movements of other fish species.

3. The stream flow was estimated at 2.5 cfs with a temperature of 58.5 degrees Fahrenheit (12:45 PM).

4. Spawning gravel beds, pools and riffles were excellent.

5. Ample stream shade and shelter existed consisting of quaking aspen, willows, rubble and boulders.

6. Mayflys, nymphs and midges were abundant, indicating that ample food was available to support trout.

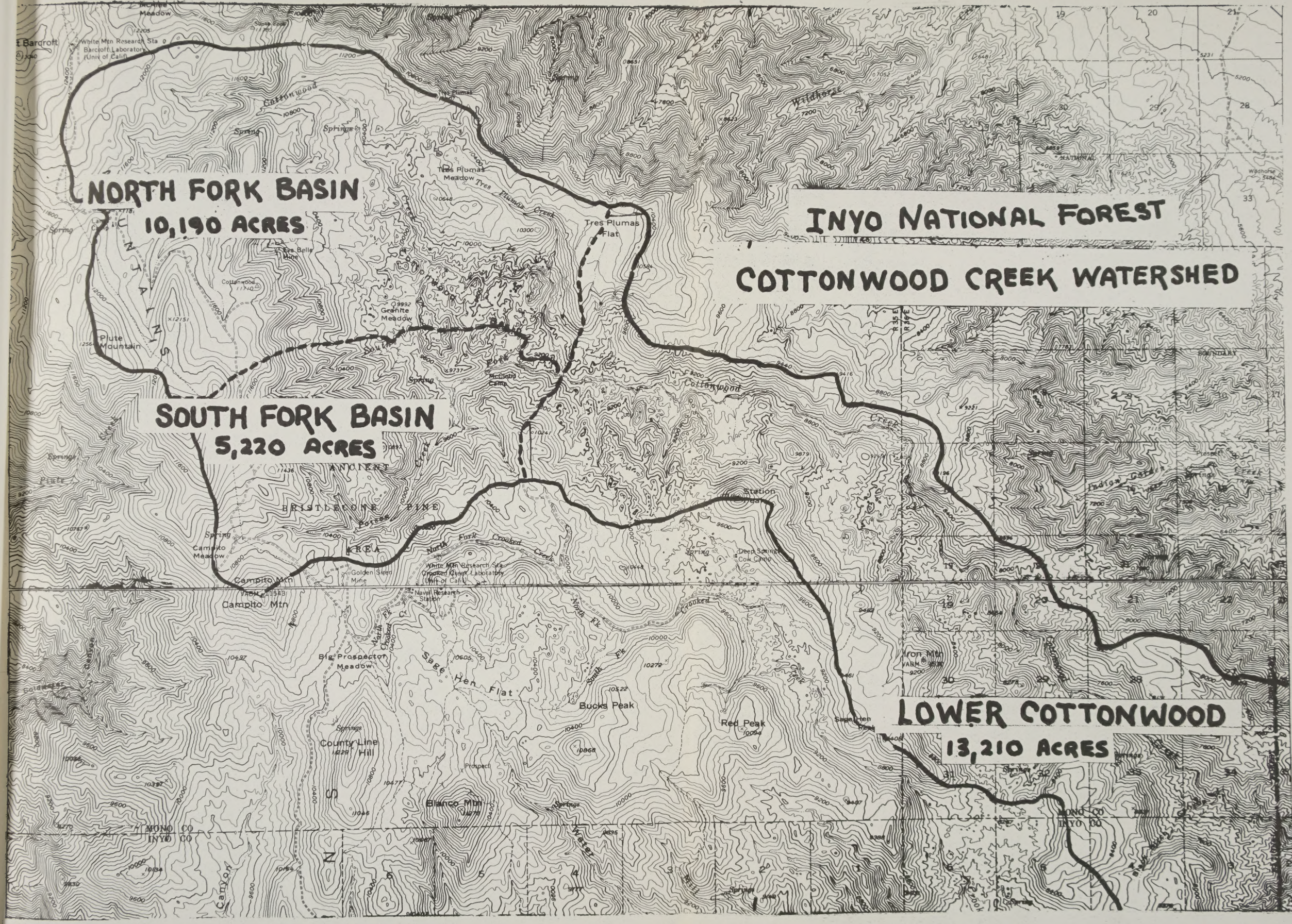
7. Extreme fluctuations in streamflow are believed to be infrequent because the creek is largely spring fed, and there is no evidence of high or damaging flows.

8. The stream is remotely situated and not easily accessible.

In late August 1946, 407 fish were caught in Bull Canyon Creek, Coyote Valley Creek, and Corral Valley Creek for the Cottonwood Creek transplant. After transportation 401 Piute trout were planted in the North Fork of Cottonwood Creek.

Shasta beaver were also planted by the California Department of Fish and Game in the North Fork on August 8, 1946. The plant consisted of three males and two females. This planting was successful, but not in the North Fork. The present beaver colony is located below the confluence of the North and South Forks in Cottonwood Creek. No estimate of present numbers or the condition of the habitat is available.

In 1949, 5,000 rainbow trout fingerlings were inadvertently planted above Llewellyn Falls. As Piute trout and rainbow trout will interbreed the genetic purity of the native Piute population was endangered. The California Department of Fish and Game and the Toiyabe National Forest were greatly concerned. Fortunately, a genetically pure uncontaminated source of Piute trout was found in the upper isolated tributaries above Upper Fish Valley. In 1964 all fish life was chemically eradicated below these upper tributaries and brood stock from the uncontaminated source was redistributed throughout Silver King Creek above Llewellyn Falls.


NORTH FORK BASIN
10,190 ACRES
SOUTH FORK BASIN
5,220 ACRES
INYO NATIONAL FOREST
COTTONWOOD CREEK WATERSHED
LOWER COTTONWOOD
13,210 ACRES
White Mtn Research Sta
Barcroft Laboratory
Univ of Calif
Tres Plumas Meadow
Tres Plumas Creek
Tres Plumas Flat
Tres Belle Mine
Granite Meadow
Plute Mountain
McClellan Camp
Cottonwood Creek
Waldhorst
Station
Deep Spring Cow Camp
Indian Creek
Campito Meadow
Campito Mtn
Golden Sheen Mine
Naval Research Station
Big Prospector Meadow
Sage Hen Flat
Bucks Peak
Red Peak
County Line Hill
Blanco Mtn
Iron Mtn
Sage Hen Creek
North Fk Crooked Creek
South Fk Crooked Creek
Crooked Creek
BRISTLECONE PINE
ANCIENT
AREA
MONO CO
INYO CO

Additionally, in 1965, all Piute waters in Upper Fish Valley were closed to angling to protect the uncontaminated stock and allow the eventual reestablishment of the subspecies throughout the native range.

TABLE 1. Piute trout transplants and evaluations*

Year	Water	County	Status
1937	Leland Lakes	El Dorado	Disappeared
1946	N.F. Cottonwood Creek	Mono	Small, but self-maintaining
1957	Bull Lake (Wolf Creek drainage)	Alpine	Spawned successfully
1960	Birchim Lake	Inyo	No spawning Transplant successful
1966	Delaney Creek (Yosemite N.P.)	Tuolumne	Not evaluated as yet

*Compiled from California Department of Fish and Game records.

II. THE PIUTE TROUT

A. DESCRIPTION

The general color of the Piute trout is maroon with dark splotches ("parr marks") along each side. The dorsal fin and the tail are mostly spotless. The ventral surface is white to pink with almost black lower fins. The throat and gills covers are bright orange-red, the same as in the Lahontan and other cutthroat trouts. Individual fish can show considerable variation and this description is a composite of typical specimens. The Piute trout is a subspecies of the cutthroat trout (Salmo clarkii).

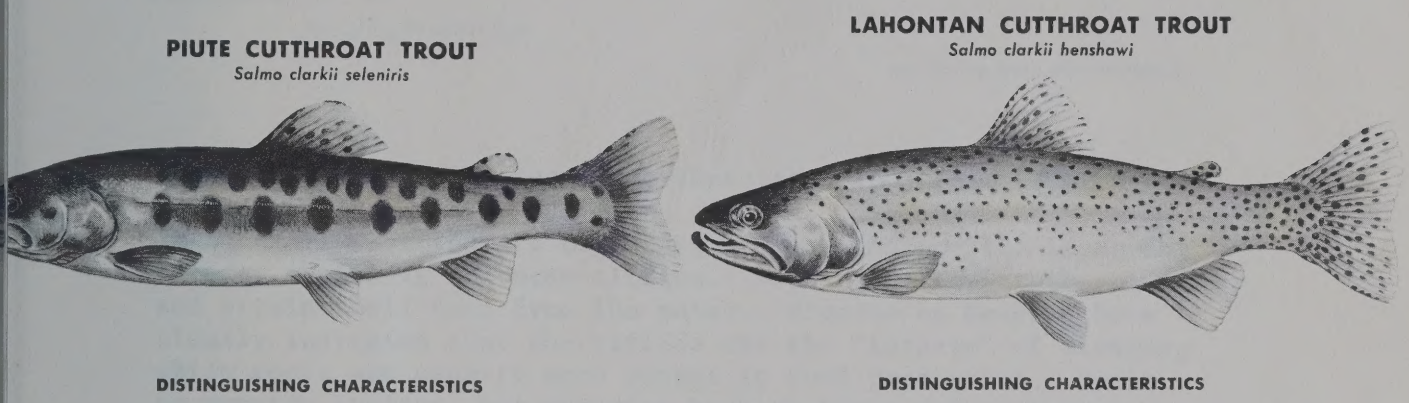


Figure 4. Comparison of the two Great Basin subspecies of the cutthroat trout.

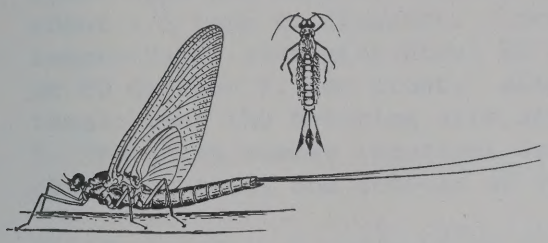
B. CHARACTERISTICS

The Piute trout is adapted to small coldwater streams at high elevations, typically with beaver ponds and through stringer meadows. Their native range is the upper Silver King Creek drainage above Llewellyn Falls, an impassable fish barrier. They do not do well in waters occupied by other fish species, especially other trout. Both the golden trout and Piute trout evolved in isolated waters, the Piute from the cutthroat and the golden from the Kern River Rainbow. Several fishery studies have shown that the development of new subspecies in unique and geographically isolated environments may be quite rapid. Piutes are quite easily caught, and populations cannot maintain their numbers under heavy fishing pressure.

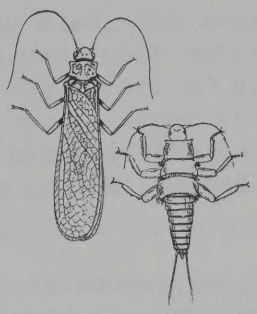
In streams this species does not attain large size, and most adult fish will average from five to nine inches, although 13 and 14-inch fish are known. However, in lakes the growth rate is much greater: One of the largest Piutes on record was an 18-inch fish taken from Birchim Lake in Inyo County.

C. FOOD HABITS

Terrestrial and aquatic insects are the main items of diet. In Cottonwood Creek mayfly and stone fly nymphs are probably the most important foods.



Spring Mayfly and Nymph



Late Spring Stone Fly and Nymph

Figure 5. Two of the most important items in stream trout diets.

These small invertebrate organisms are adapted to life in moving waters, typically in rocky riffles. Both varieties are herbivores and strain their food from the water. Studies by Needham have clearly indicated that the riffles are the "larders" of streams, while pools are usually much poorer in food production. Pools do provide shelter, but scouring by high flows and sediment deposition reduce their productivity. Riffles provide a far greater variety and number of habitat niches. Stream faunas are highly variable in distribution and seasonal or annual abundance. Deposition of silt in streams often destroys aquatic insect populations by filling in and/or covering productive areas. Productivity can be greatly reduced through this aspect of erosion, and biologists agree that this is a serious problem in many California trout streams.

D. REPRODUCTION

Most California trout species on the average, first spawn when three years old. They mature at ages from one to five, but this varies between species and populations. The precise spawning age of the Piute trout in Cottonwood Creek is presently unknown.

Piute trout spawn from April to early July, depending on temperatures, and are classed as spring spawners. They spawn only once a year. The most preferred sites are riffles, with loose, non-compacted, fine gravel on moderate gradients below the lower end of pools.

The female selects the spawning site and digs a nest (redd) in the gravel. The eggs are deposited into the nest, milt is applied by the male and female covers the eggs. Several pits are dug ahead of the first and spawning is repeated until the female is spent,

Figure 4. Two of the most important items in stream trout diets.

These small invertebrate organisms are adapted to life in moving
waters, typically in rock
mon stream
clean
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diversity
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be
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rocks.

which may require a week. Almost all eggs are buried effectively, and fertilization rates are generally high.

Fish generally have extremely high reproductive rates. Fecundity of trout varies with species and size from less than 200 to over 9,000 eggs per female. Mature eggs vary in size also, but average about 1/5 inch in diameter. Incubation periods vary with water temperature, averaging about 80 days at 40 degrees F. and 19 days at 60 degrees F. for trout. After hatching the young trout (fry) remain near the hatching site until fingerling size is attained. In the early summer important spawning sections can be located by observing redds and schools of small fish.

The deposition of sediment on gravel spawning beds causes reduction in egg survival rates by reducing the flow of water through the gravel. This results in an insufficient supply of oxygen to the eggs and newly-hatched fry. The eggs are "smothered" by sediment. Siltation is most serious during periods of low flow. During the spring run-off the scouring action of high water actually cleans the gravel and is essential for the maintenance of good spawning areas. Human activities in the fall that expose bare soil adjacent to streams present a critical threat to good, clean, productive streams, and should be avoided.

E. HYBRIDIZATION

Piute trout will readily hybridize with rainbow and other subspecies of cutthroat trout. Sterile or less fertile offspring and the loss of genetically pure stocks is the immediate result, leading to eventual destruction of the subspecies.

F. COMPETITION

Competition and predation by other trout has been highly detrimental to Piutes. They do well only in waters where other trout are absent. Competition for food and space are the primary conflicts. Their relative intolerance and narrow critical environmental limits make Piutes poor competitors.

G. THE PARENT STOCK

The closely related Lahontan cutthroat trout, from which the Piute apparently evolved, is a colorful member of the complex rainbow-cutthroat series of salmonid fishes. It is native to the Lahontan drainage of west-central Nevada and east-central California. Lahontan "cutts" originally were extremely abundant in Lake Tahoe, and at one time supported a considerable commercial fishery there and in Pyramid Lake. Other waters with important populations were Winnemucca and Walker Lakes, the Humboldt, Truckee, Carson, and Walker Rivers, and some of the small tributaries (Coleman-1927 and La Rivers-1962). In recent years (especially since the early

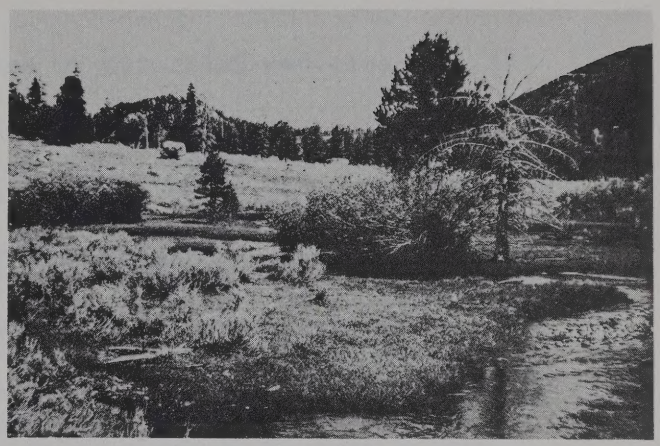
1940's) Lahontan cutthroat populations have greatly declined. Several factors are responsible: hybridization with introduced rainbow and Yellowstone cutthroat; competition with and predation by lake trout, rainbows, brown, and eastern brook trout; the construction of dams that blocked spawning runs; and habitat destruction such as diverting water for irrigation, sediment pollution, etc. Thus, both the parent Lahontans and the offspring Piutes, the entire native Great Basin cutthroat stock, and so abundant, is threatened with extinction.

III. THE HABITAT

A. THE NATIVE HABITAT (SILVER KING CREEK)

Figure 6.

Silver King Creek at Connell Cow Camp



Fly Valley Creek

Silver King Creek is a tributary to the East Fork of the Carson River in southeastern Alpine County. The major portion of the native Piute trout habitat is on privately owned land. Silver King Creek begins at about 9,600 feet elevation, north of Sonora Pass. The elevation at Llewellyn Falls is 8,000 feet, a distance of four miles below the headwaters. The watershed slopes predominately to the north. The average snow depth is approximately three feet with a maximum of eight feet recorded in 1952 and a low of about one foot in 1951. This is typical sub-alpine environment of the Sierra eastside.

1. Hydrography: Surface water data records from the U.S.G.S. station on Silver King Creek show the following conditions.

   a. 30 square miles of drainage area.

   b. The average discharge from 1946 to 1951 was 37.3 cfs.

   c. The maximum discharge was 748 cfs on November 20, 1950, while the minimum was 2.5 cfs on October 28 and November 8, 1948.

2. Current California Department of Fish and Game Management Program: The following recommendations to preserve the Silver King Creek Piute trout fishery have recently been made by the California Department of Fish and Game (Gerstung-1965).

   a. The 520 acres of private land in Upper Fish Valley should be acquired by the Toiyabe National Forest.

   b. Cattle grazing is not incompatible with fishery habitat preservation if carefully controlled.

c. Fencing of stream banks which are sloughing into the stream is desirable.

d. The complete prohibition of motorized vehicles is strongly recommended.

e. A Piute Trout Wilderness Area, similar to the proposed Golden Trout Wilderness Area is recommended.

B. THE INYO NATIONAL FOREST HABITAT (COTTONWOOD CREEK)

The Cottonwood Creek watershed, within the Inyo National Forest boundary, contains 29 square miles or 18,560 acres. The highest elevation in the watershed is Piute Mountain, 12,564 feet and the lowest elevation in the National Forest portion is 6,560 feet at the National Forest boundary to the east, a distance of 14.5 miles. In the upper basins Cottonwood Creek flows through a series of relatively flat stringer meadows. Pools and riffles with good gravel for spawning are present. The entire drainage is surrounded by ridges and peaks from 1,000 to 2,000 feet above the stream. Large weathered granite rocks of unusual form and shape are an impressive feature.

TABLE 2. Relationship of slope and distance on National Forest portion of Cottonwood Creek*

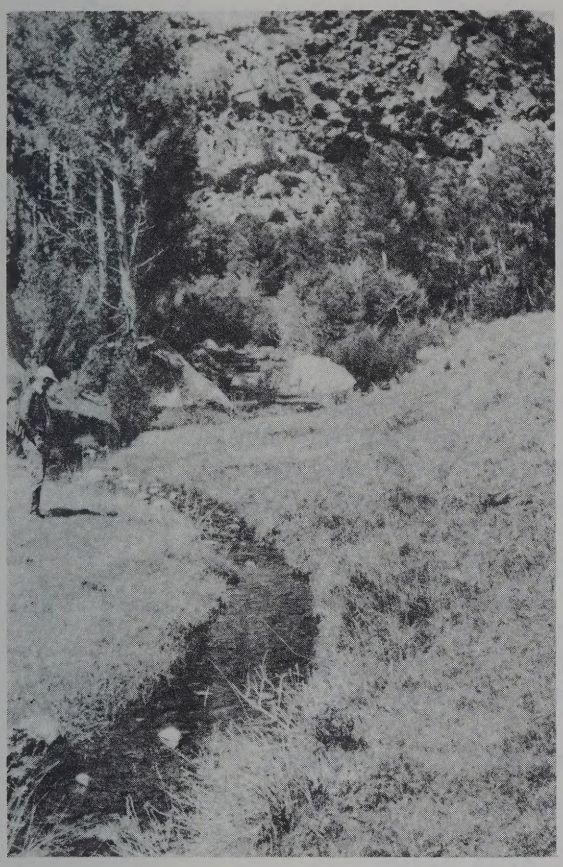
Location	Miles	Elevations High	Low	Drop in Elevation
+N.Fk., headwaters to Tres Plumas Creek (just above natural barrier)	3	10,320	9,280	1,040
N.Fk., Tres Plumas Creek to confluence with S.Fk.	1	9,280	9,040	240
S.Fk., to confluence with N.Fk.	1.5	9,420	9,040	380
Confluence N. & S. Forks to N.F.B.	10	9,040	6,560	2,480
Watershed Totals	15.5	10,320	6,560	3,760

*Compiled from U.S.G.S. quad sheets.

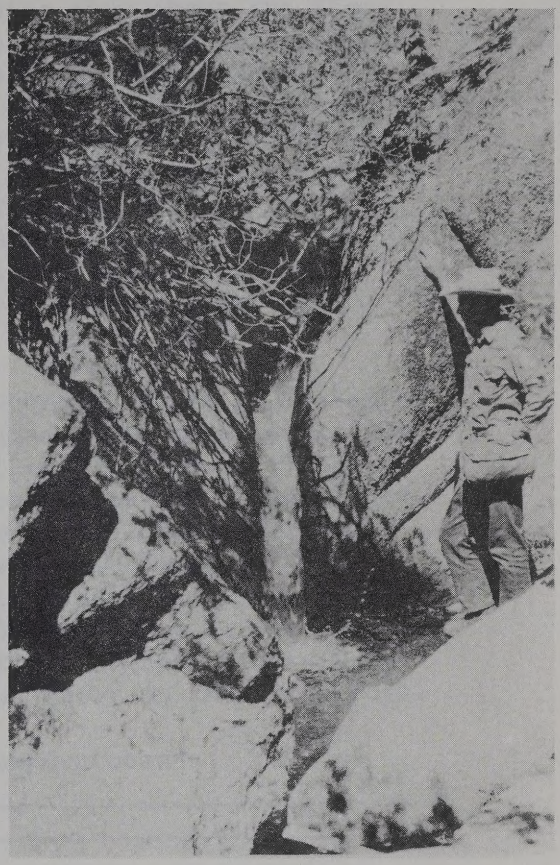
+Piute trout waters.

There are no lakes in the White Mountains, and only a few streams on the east slopes that support fish. Limited fisheries are present in Wyman, Crooked and Cottonwood Creeks. The White Mountains are

Figure 7.



North Fork Cottonwood Creek



N.F. Cottonwood Creek Fish Barrier

Upper Cottonwood Basin - White Mountains

a tremendous fault-block mountain range, typical of many other Great Basin ranges in Nevada. The mountains rise above the floor of the Owens Valley, elevation 4,141 feet, in a steep scarp terminating on White Mountain Peak, 14,246 feet. The White Mountains are less rugged than the Sierra Nevadas. The present topographic form was acquired near the end of the Tertiary Period, during the Pliocene, well over a million years ago. The deep canyons were cut as a result of extremely humid conditions during the first glacial epoch. The Cottonwood drainage developed at this time. The east slopes of the White Mountains are not as steep as the west slopes. The bulk of the run off flows eastward into Fish Lake Valley, Nevada.

1. Water Regime - Volume-flow of Cottonwood Creek in September 1966 was estimated as follows: above Granite Meadows (just below the headwater area), 2 cfs; below the Tres Plumas Creek junction, 3 cfs; and the confluence of the North and South Forks, 4.5 cfs. Streamflow in the Upper Cottonwood Basin are primarily spring fed, with little annual fluctuation. A total of ten springs have been located on the North Fork and three on the South Fork. It was estimated in 1946 that the greatest flow was approximately 7 cfs, the result of a minor cloud burst on the North Fork.

TABLE 3. Comparison of Water and Air Temperatures*

Station Number	North Fork Cottonwood Creek	Air	Water	Time
1	"	50.0	50.0	5:30 PM
2	"	52.0	45.0	3:35 PM
3	"	50.5	49.5	11:00 AM
4	"	54.5		3:40 PM
5	"	58.0	47.0	
6	"	58.5	48.5	10:45 AM
7	South Fork Cottonwood Creek	55.0	43.0	10:00 AM

*Recorded on September 20 & 21, 1966.

2. Vegetational Composition - The following vegetative types occur in the Cottonwood Creek watershed:

   a. Sagebrush (*Artemisia tridentata*) (*A. cana*) (*Chrysothamus spp.*)

   b. Pinyon (*Pinus monophylla*)

   c. Browse (*Purshia tridentata*) (*Cercocaprus intricatus*) (*Salix spp.*)

d. Meadow (Carex spp.) (Deschampsia caespitosa) (Juncus spp.)

e. Perennial Grasslands (Stipa spp.) (Koeleria cristata) (Poa spp.)

f. Conifer (Pinus flexilis) (P. aristata)

g. Broadleaf Trees (Populus tremuloides) (Populus trichocarpa)

3. Climate - The climate of the Cottonwood Creek watershed is cool and arid. The average annual precipitation for the past 10 years at Crooked Creek Research Station, three miles south of the area, is 12.54 inches, with the bulk occurring from January to May. Over 80 percent of the precipitation falls as snow, and summer thunder showers account for 20 percent of the total.

The average mean temperature is 34.6 degrees. From 1953 to 1962 the maximum temperature was 76 degrees, and the low minus 21 degrees F. The high diurnal temperature has varied as much as 54 degrees, while the low diurnal temperature only varied one degree.

Winds are predominantly from the southwest and west. Maximum wind velocity recorded was in March of 1954: 53 knots from the northeast. Winds average from 3 to 15 knots.

Concern has been expressed that summer cloud bursts could completely destroy Piute trout fishery by catastrophic washout. Thunder storms are common during July. Records during the past 10 years indicate the heaviest amounts of rainfall during the summer were as follows: In 1956, 3.25 inches in 8 days and in 1959, 2.05 inches in 2 days. Close inspection of the riparian area reveals no evidence of high, damaging runoff. It does not appear that cloud bursts present a great threat. Data from the Crooked Creek Research Station indicates that a true cloud burst has not occurred in the past ten years.

4. Livestock Use - Livestock use records show that approximately 40,000 head of sheep grazed the White Mountains prior to control by the Inyo National Forest. The precise number that used the Cottonwood Creek watershed is unknown, but the suitability of the range is excellent. Sheep trails are still evident in some areas of the Whites. From 1923 to the present, the Cottonwood Allotment has been stocked with 200 head of cattle, from July 1 to September 15 for a total of 500 animal-months. Non-use was taken during 1953 and 1954, and again in 1961, 1962, and 1963.

Cattle concentrate on the sedge meadows along the streams and near springs. The use of hillside forages is light due to slope and terrain. The present permitted cattle use is rated at about two acres per animal-month on the streamside meadows. Although sagebrush has encroached into the meadows and presents management problems, raw stream banks and soil-sloughing are not a serious problem in this watershed.

Fluctuation in growing seasons and range readiness are common within this allotment. Grazing these meadows at the proper growth stages is very important. The use of this allotment for summer cattle grazing is an extremely important privilege to the ranchers of Fish Lake Valley in Nevada.

5. Land Status - All of the land within the Cottonwood Creek watershed which is suitable for Piute trout habitat management is administered by the Inyo National Forest.

IV. MAJOR PROBLEMS

A. HYBRIDIZATION WITH RAINBOW AND CUTTHROAT TROUT

This species evolved in waters isolated from all other fish. The maintenance of genetically pure stocks is highly important. Piute trout will readily cross with rainbows and other cutthroat trout, and produce fertile offspring. Unauthorized plants of fish into Cottonwood Creek by well-meaning fishermen must be prevented. The presence of rainbow trout below the "Tres Plumas Creek" barrier poses a serious hazard. Studies have proven that speciation is not the aimless wandering of genes through the organic world, but an orderly adjustment under rigid control of the environment (Hubbs-1940).

B. THE PIUTE TROUT IS NOT ADAPTABLE TO VARIED ENVIRONMENTS

Efforts by the California Department of Fish and Game to extend the range of the Piute trout by stocking wild fish and establishing self-sustaining populations have been disappointing. Cottonwood Creek is the only proven successful establishment to date. Evidence indicates that this subspecies is highly intolerant in its acceptance of habitats. This is understandable when we consider that Piute trout evolved to fill a specific niche. They are now present in less than 15 miles of stream in California.

C. VULNERABLE SPECIES

The Piute trout is not noted for its wariness. They cannot support heavy fishing pressures, and will always require some form of restrictive regulations. Management programs must consider the Piute trout as a unique fish. From a quantity viewpoint rainbows or eastern brook trout could provide a greater sustained production in Cottonwood Creek, but fish-watching and public enjoyment of this rare and beautiful subspecies offer higher quality recreation than the more common species provide through angling. The aspect of scientific preservation also is imperative.

D. PRIVATE LANDS IN THE UPPER FISH CREEK DRAINAGE

Most of the native Piute trout habitat, 520 acres, is on private land. Damage to the area by private interests is a serious threat. Acquiring this land may be extremely difficult. This fact places even greater importance on the Cottonwood Creek Piute population, especially since this habitat is on National Forest lands.

E. SPECIFIC HABITAT PROBLEMS ON COTTONWOOD CREEK

1. Rainbow trout populations from below the Tres Plumas Creek barrier have in past years somehow gotten

upstream of the barrier and crossed with the Piute trout.

2. The possibility of a major cloud burst in the upper basins of Cottonwood Creek appears to be slight, but not impossible. The entire population could be destroyed. However, the important fact is that this environment is suitable for Piute trout and they could be restocked.

3. Polution from increasing recreation camping near McCloud Camp could be a problem in the future. Proper planning and management is required.

4. Livestock use on the meadows along Cottonwood Creek is heavy and needs to be closely managed for compatible use.

V. RESPONSIBILITIES

A. The Inyo National Forest is responsible for all phases of habitat management related to the Piute trout in Cottonwood Creek. This is accomplished by protection, coordination of uses, and enhancement. Examples of habitat responsibilities are as follows:

1. Habitat Protection - Detection and suppression of wild fires; maintenance of streamside vegetation for shade and cover; maintenance of water quality; and surveillance and control of water rights and diversions.

2. Coordination of Uses - Wise multiple use integration of livestock grazing practices, recreation developments and programs, public access roads location and construction, special use permits and cooperative agreements.

3. Habitat Improvements - Flow regulator dams, fish-proof barriers, pool construction, provision of adequate spawning beds, and streamside protection fences.

B. The California Department of Fish and Game is responsible for protection, conservation, propagation, and preservation of the Piute trout. Specifically the Department's responsibilities are as follows:

1. Fishery Protection - Enforcement of laws and regulations related to limits, seasons, method of taking and possession, closures of waters to fishing, and the control of undesirable fish.

2. Conservation - Management and research studies of the fishery to determine proper laws and regulations, establishment of the optimum sustained harvest rates, and basic management information.

3. Propagation - Production of fish required and wise stocking of fishing waters to attempt to meet angling demand that is beyond the natural productive capacity of the waters.

4. Preservation - Studies and control of diseases and parasites, monitoring and recommendations on the use of pesticides.

VI. MANAGEMENT OBJECTIVES

In general the management objectives for the Piute trout habitat in Cottonwood Creek are to insure that the habitat will be maintained and improved to perpetuate this rare and endangered wildlife species for the use and enjoyment of the public.

We are specifically concerned with the following objectives:

A. To recognize the esthetic value and uniqueness of the Piute trout is a primary consideration.

B. To maintain the resource for its scientific and educational use. The ecological relationships are extremely important for study and research.

C. To provide a diversity of wildlife and recreational experiences to visitors to the Inyo National Forest. A wide spectrum of wildlife will enable the individual to select his most rewarding experience.

D. To blend the management of the habitat and fishery so that a complete program is achieved. Close cooperation with the California Department of Fish and Game is essential.

E. To continue to coordinate the management of other resources to enhance and improve the Piute trout habitat (Watershed-Recreation-Range).

F. To increase our Information and Education programs relative to Piute trout, with particular emphasis on the intrinsic value.

VII. PROCEDURES

A. ANNUAL RECURRENT JOBS

1. Field Inspection Trips - The California Department of Fish and Game District Fishery Biologist and his staff conduct annual field inspection of the Piute trout fishery in Cottonwood Creek. The White Mountain District Ranger and the Forest Wildlife Biologist should participate in these surveys to evaluate the habitat and increase the cooperative approach to wildlife management.

2. Meadow Condition and Trend - Granite Meadow transect can be used to determine the deposition of silt from surface erosion. Both vegetative and soil trends are available from this permanently established bench mark. The data collected every five years should be analyzed and reviewed with the District Fishery Biologist. In 1966 a section of streambank along Cottonwood Creek was fenced. A permanent condition and trend transect will be installed in this exclosure during the summer of 1967. Comparisons with the unprotected Granite Meadow transect will provide highly desired information.

3. Livestock Allotment Inspections - The White Mountain District Ranger makes at least two range inspections on the Cottonwood cattle allotment annually (range readiness and utilization). It is suggested that notes be collected on any specific areas of streambank-sloughing and gully-cutting. The standard range utilization procedure can supply the needed information on the impact of cattle on the fishery if adequate attention is given this aspect during this check.

4. Annual Wildlife Coordination Meeting - Once a year the Inyo-Mono wildlife and land administering agencies meet to discuss and coordinate their activities for the coming year. Both specific and general topics are discussed. Because of the rare and endangered status of the Piute trout it is recommended that a summary of the past year's work and proposed future work be discussed annually at this meeting. The minutes of this meeting will provide a source of information regarding Piute trout.

B. NON-RECURRENT JOBS

1. The California Department of Fish and Game has recommended that all waters in the Cottonwood Creek drainage be devoted to a Piute trout fishery. The plan is to chemically remove populations of eastern brook

trout and rainbow trout throughout the entire drainage. The Piute trout now limited to the North Fork could then move downstream past the barriers and extend the established population to the entire Cottonwood Creek drainage. Transplants of fish from the North Fork would be made as deemed appropriate. The White Mountain District Ranger and the Forest Wildlife Biologist will assist with this important project.

2. As Piute trout increase in Cottonwood Creek it is suggested they be stocked also in Cabin Creek, a tributary of Leidy Creek, on Chiatovich Flat at the north end of the White Mountains. It is recommended this area be inspected during the summer of 1967 to determine its suitability. Cabin Creek is barren of fishlife, has a natural barrier above Leidy Creek Canyon and the average flow is estimated at 2 cfs, with approximately the same water regime as Cottonwood Creek.

3. The Inyo National Forest in cooperation with the California Department of Fish and Game should produce a short popularized handout pamphlet on the Piute trout for distribution to the general public.

   A suggested outline is presented:

   a. The Piute Trout, its life history and development.

   b. Importance as a rare-unique species with limited habitat.

   c. The major problems, (including hybridization and high speciation).

   d. How You May Help (including emphasis on unauthorized plants and pollution of water).

4. Permanent stream photographic records can provide an important source of general trend data. It is recommended that a minimum of three permanent photo points be established, one on the North Fork, one on the South Fork, and one on the main channel. Special features such as falls, barriers, riffles, meadows and pools should also be included in the photographs. Upstream views are preferable. A satisfactory permanent bench mark can be made by driving a metal pipe about two feet into the ground. Complete data should be recorded and copies filed when the first photographs are taken.

5. The beaver populations below the junction of the North and South Forks should be investigated. Information is needed on the following subjects:

    a. The estimated number and age-class of individuals.

    b. The following should be marked on an aerial photograph:

        1) Active and inactive dams

        2) Houses and heavy cutting areas

    c. An appraisal of any damage to the stream and food sources.

C. HABITAT IMPROVEMENTS

Past experience with various standard trout stream improvement structures throughout California has not been encouraging. A cautious approach is, therefore, recommended. The most common causes of structural failure are: unstable soils, high-velocity floods, and insufficient wing-lengths on structures causing end-cutting. Experts agree that log dams and accelerators or flow-deflectors are a waste of funds in most California trout streams. Projects such as soil and gully stabilization to prevent silt deposition, the removal of barriers to allow fish movement within the stream, debris clearance, riparian cover manipulations, and the fencing of stream banks to protect cover and channel are encouraged.

The Cottonwood Creek in the Upper Basin is a small, spring-fed stream with an extremely stable regimen. Fluctuations in temperatures and flow appear to be slight. Habitat improvements may be beneficial provided careful planning is accomplished.

The following type of projects are considered the best possibilities:

1. Several small partial barriers, above the main barrier prevent the movement of fish throughout the North Fork. The removal of these rocks and waterfalls would allow freer use of a greater area.

2. Spawning gravel beds could be established in deficient sections. Clean gravel of the proper size could be packed into the stream by mule. Sites should be carefully selected.

3. The two large springs along the North Fork of Cottonwood Creek, one a mile above Granite Meadows Creek, and the other about one mile below, should be fenced to prevent cattle trampling. Each improvement project should be designed so that a full and complete evaluation of benefits can be made in the future.

VIII. MULTIPLE USE COORDINATION

A. RANGE MANAGEMENT (2606.11)

In 1964 the livestock allotment analysis of the Cottonwood cattle allotment was completed. The concentration of cattle in the key areas on streamside meadows along Cottonwood Creek, and cattle use in the upper basin before the range is ready are the major problems. These meadows are stocked at approximately two acres per cow month. The following procedures to improve the management of this allotment were recommended in the approved allotment management plan:

1. A three-unit deferred rotation system of grazing is needed. The allotment will be divided into 3 units requiring only 6 miles of fence, with grazing as follows:

TABLE 4. Proposed Cottonwood Creek Cattle Allotment Management System*

Units	Elevations	AMs	On	Off
Deadhorse	8,000	200	7/1	8/1
Middle	8,400	200	8/1	9/1
Granite	10,000	100	9/1	9/15

*Taken from the Cottonwood Creek Cattle Allotment Management Plan

2. Salt logs and blocks should be removed from the meadows and placed in the sagebrush types away from the water.

3. The McCloud Camp special use pasture situated along the South Fork of Cottonwood Creek, 20 acres in size, is for the horses used in the handling of cattle. A total of 14 AM from 7/1 to 9/15 is permitted. This pasture cannot be used as a holding pasture during the fall roundup. If a fenced area is needed to hold cattle, it is recommended a sagebrush area away from the meadows be selected.

4. Control of silver sagebrush (Artemisia cana) in the streamside meadows would benefit both Piute trout and the cattle. The erosion hazard would be reduced by increased sod-forming grasses, and reduction of silt-deposition in the stream would result. Many of the meadows needing this control are below the present Piute trout waters. Extreme care is required to prevent the drift of 2, 4-D into willows, aspen, and cottonwood trees during control spraying operations. Drift of small amounts of 2, 4-D

into the stream would not be harmful to the fishery if aqueous carriers are used.

B. RECREATION MANAGEMENT (2616.12)

In 1962 the Bristlecone Pine Recreation Area Plan was completed. This plan includes the Cottonwood Creek watershed, with a new campground near McCloud Camp and a new access road from Crooked Creek.

The McCloud Campground development has a low priority on the Forest's schedule for construction. Current camper use is mainly deer hunters and a few fishermen. Shelters and camp sites are close to the stream, no toilets are available. Garbage cans are provided. It will be determined how best to handle both camping and fishing as the projects progress.

C. ENGINEERING (2606.32)

The road into Cottonwood Creek is extremely rough and steep. It is a jeep trail, but can be traveled by a pickup. This road is not on the Forest Road and Trail System. In the future if a new road is constructed the following items must be considered.

1. The location should provide for complete stream protection. Stream crossings should be avoided when possible.

2. Water bars must be located at sufficient intervals to prevent concentrations of water on the steep slopes.

3. Cuts and fills should be seeded with grass to prevent erosion.

IX. REVISION OF THIS PLAN

Corrections, improvements, and updating are extremely important. It is suggested that as changes arise, or comments need to be added, they be noted on the proper page. This plan is intended to be a working copy, not bookcase material.

New materials will be sent to the Districts at various times. This new data can be attached to the appendix.

We recognize that many deficiencies and gaps in information exist in this Piute Habitat Management Plan. However, as we become more active and test various methods and procedures specific beneficial programs will become available. In 1971 this plan should be reviewed and if sufficient new information is available a revised second edition written.

APPENDIX

I. GROUND COVER COMPOSITION - COTTONWOOD CREEK WATERSHED.

II. PRESERVING THE PIUTE - FROM OUTDOOR CALIFORNIA.

III. THE FUTURE OF THE PIUTE TROUT - ERIC R. GERSTUNG.

IV. WILDLIFE HABITAT - STREAM IMPROVEMENT.

V. COOPERATIVE RELATIONS: HABITAT MANAGEMENT
ENDANGERED SPECIES - TOIYABE NATIONAL FOREST.

VI. COMPARISON OF RAINBOW TROUT AND LAHONTAN CUTTHROAT TROUT.

VII. WEATHER RECORDS FROM BARCROFT AND CROOKED CREEK RESEARCH STATIONS.

VIII. REFERENCE MATERIALS.

VII. REFERENCE MATERIAL.

I. GROUND COVER COMPOSITION - COTTONWOOD CREEK WATERSHED
By Percent - 1965

	2(4) McCloud Camp West	2-10-4 Poison Creek	2(4) Granite Meadow	(2) East McCloud Camp	(2) Upper Cottonwood Meadow	1(4) West Tres Plumas	(2) Lower Cotton-wood
GROUND SURFACE TALLY							
Bare Soil	10	5	20	0	2	5	10
Pavement	3	4	7	0	0	30	4
Rock	1	11	1	0	0	2	0
Litter	39	59	21	30	24	21	32
Moss	0	0	0	0	3	0	0
TOTAL	(53)	(79)	(49)	(30)	(29)	(58)	(48)
SHRUB TALLY							
Sagebrush	12	12	9	0	6	21	6
Bitterbrush	0	0	0	0	0	2	0
California Rose	2	0	0	0	0	0	0
Buckwheat	0	0	0	0	0	2	0
Rabbitbrush	1	0	0	0	0	0	0
Currant	1	1	0	0	0	0	0
Quaking Aspen	1	1	0	0	0	0	0
Willow	0	0	0	0	2	0	0
TOTAL	(17)	(14)	(9)	(0)	(8)	(25)	(6)
HERBACEOUS PLANT TALLY							
Phlox	0	0	0	0	0	8	0
Great Bain Wild Rye	6	0	0	0	0	0	3
Hat Muhly	4	2	6	0	11	0	12
Sedge	8	0	11	45	20	1	12
Small Wire Rush	1	0	3	0	9	0	2
Indian Ricegrass	1	0	0	0	0	0	0
Bluegrass	0	0	0	0	0	0	4
Needle & Thread	1	0	0	0	0	0	0
Nourse Meadow Rush	7	0	6	9	6	0	6
Annual Weeds	2	0	2	3	0	3	6
Donkey Flower	0	0	0	12	3	0	0
Tufted Hairgrass	0	2	0	0	0	0	0
Tall Larkspur	0	1	0	0	0	0	0
Lupine	0	2	0	0	0	0	0
Clover	0	0	1	0	3	0	0
Junegrass	0	0	3	0	2	2	0
Bearded Wheatgrass	0	0	1	0	0	0	0
Letterman Needlegrass	0	0	1	0	0	3	0
Pentstemon	0	0	1	0	2	0	0
Dandelion	0	0	1	0	1	0	0
Cinquefoil	0	0	1	0	2	0	0
Buttercup	0	0	0	0	1	0	1
Thistle	0	0	0	0	3	0	0
TOTAL	(30)	(7)	(37)	(70)	(63)	(17)	(46)

PRESERVING THE PIUTE

The Rare Piute Trout Faces a Tough Fight for Existence; Here's What the DFG is Doing to Help . . .

The Piute Cutthroat Trout, a first cousin of the Lahontan cutthroat trout, is a unique and colorful fish that evolved in an isolated stream in a remote area of California's Alpine County east of the Sierra Nevada divide. The Piute trout was first described by J. O. Snyder in 1933 from specimens collected in upper Silver King Creek above Llewellyn Falls, an impassable barrier located at the lower end of Upper Fish Valley. Silver King Creek is a tributary of the East Carson River.

Due to the restricted range of this fish, it was decided by biologists of the former Division of Fish and Game that introductions into other waters would be in order to insure its survival in the event a natural or man-made disaster might doom it to extinction in its native habitat. In 1937 a transplant was made to the Leland Lakes in El Dorado County but it was unsuccessful.

In 1946 the North Fork Cottonwood Creek, located in a remote area of the White Mountains of Mono County, was found to be barren of fish life and had an impassable barrier at its lower end. In late August of 1946 about 400 Piute trout were collected and successfully introduced there.

New Populations

During the 1946 collection trip Division personnel found that there were established populations of Piute trout in previously barren Corral Valley and Coyote Valley creeks which are tributary to Silver King Creek below Llewellyn Falls. There is an impassable barrier which prevents migration of fish from Silver King Creek into these two creeks. It is reported that stockmen had transferred Piute trout to these streams.

A man-made problem did occur in 1949 when a group of 5,000 rainbow trout fingerling was inadvertently planted above Llewellyn Falls. A subsequent survey showed that the rainbows survived but no evidence that they were interbreeding with the Piutes was found in over 100 fish collected during 1956 and 1957. The Piute trout collected in 1957 were planted in Bull Lake in the Wolf Creek drainage in Alpine County. Reproduction has occurred and this small lake now has a growing population of these rare fish.

Additional pressures were placed on the Piute trout's native habitat in 1952 when the angling closure was lifted on upper Silver King Creek. In late 1962 word reached the department that the Piute trout population in that creek had been seriously depleted. From all reports this species is easily caught and it is little wonder that the population could be depleted by moderate angling pressure.

Investigation

In September 1963, a group of department biologists packed into upper Silver King Creek to investigate the population depletion reports and the possibility that the fish had become hybridized by interbreeding with the rainbow trout accidentally planted in 1949. This survey found that the population was very low in Silver King Creek in Upper Fish Valley and there was considerable evidence of hybridization with rainbow trout and Lahontan cutthroat trout which, it was discovered, were present in Whitecliff Lake, a tributary to upper Silver King Creek. They also found that Corral Valley Creek contained many rainbows or rainbow x Piute hybrids.

During the investigation it was learned that in recent years angler pressure had increased greatly due in part to the ease of accessibility by motorized trail vehicles. The U.S. Marine Corps had also been using the area for survival training operations conducted at the Mountain Welfare Training Center at Pickel Meadows.

After reviewing the information collected, it was decided to resample the stream in 1964 to determine if there were any nonhybridized Piute trout in the upper tributaries which were known to have impassable barriers at their lower ends. Fortunately, isolated, pure Piute trout were found in these tributaries. With a supply of this rare fish available for restocking, a chemical treatment plan was developed to eradicate the hybridized populations and thus rehabilitate the Piute trout's native home.

The rotenone treatment was carried out during the last week of August 1964, partially through the use of Federal Dingell-Johnson Act funds. Silver King Creek and its tributaries, below the pure populations, were treated down to Llewellyn Falls where the water was detoxified with potassium permanganate. Whitecliff Lake, Coyote Valley Creek, and Corral Valley Creek were also treated at the same time and detoxified.

Due to the time lag in the detoxification process, the fish kill extended about two miles below Llewellyn Falls and this section of stream was restocked with Lahontan cutthroats shortly after treatment.

Restocking

About two weeks after the treatment approximately 50 Piute trout were caught in the upper tributaries and stocked in Upper Fish Valley. In the summer of 1965 the department plans to restock Whitecliff Lake, and Coyote Valley and Corral Valley creeks from the same sources.

The overfishing problem was attacked in two ways. First a meeting was held with U.S. Marine Corps personnel at Pickel Meadows to explain the problem. As a result of this discussion, the camp commander agreed not to conduct survival training operations in the Silver King Creek drainage. Secondly, an angling closure on Silver King Creek above Llewellyn Falls was proposed and adopted by the California Fish and Game Commission to protect the remnant population of Piute trout in their native home. When the Piute trout are stocked in Coyote Valley and Corral Valley creeks they will be protected by a closure that has been in effect since 1952.

It is hoped that these efforts will allow the population of this rare and beautiful fish to increase so they may be enjoyed in the future by Californians.

III. THE FUTURE OF PIUTE TROUT

The California Department of Fish and Game is becoming increasingly concerned over the population decline of the rare Piute trout, Salmo clarkis seleniris of Silver King Creek, Alpine County. This species of fish now exists in precarious balance with its delicate environment, having suffered considerably from the activities of man.

Attempts have been made to transfer this unique fish from its home water in Upper Fish Valley to other waters in the state. In all but two instances, these trout have failed to become established in new environments.

Fisheries biologists in the late 1950's noted that the Piute trout population was undergoing a serious decline. This decline has been largely attributed to increased fishing pressure. Unfortunately, the Piute trout appears to lack the wariness of other trout in its ability to avoid the angler's hook. The fish is extremely vulnerable to depletion under even moderate angling pressure. Results of studies conducted in 1963 seem to confirm this observation. Sections of stream opened to angling contained an end of season trout population of only one-sixth that of an adjacent unfished portion of stream.

Until 1963, the U. S. Marine Corps used Upper Fish Valley as a mountain survival training area and considerable numbers of adult Piute trout were trapped or taken with set lines by Marines during survival maneuveres. During this same period the trail vehicle became mass produced and mass marketed. A great influx of motorized anglers invaded the Silver King country during the late 1950's. Recent partial restriction of certain trails to vehicles seems to have only slightly curbed this influx.

During the 1960's a change in the physical appearance of the Piute trout became apparent. Color and spotting characteristics of both rainbow and cutthroat trout were observed. A discovery was made that accidental plants of both rainbow and cutthroat trout had occurred in the Silver King Creek drainage above Llewellyn Falls. These introduced trout had hybridized with the Piute trout.

Fortunately, a pure, genetically uncontaminated source of Piute trout was found in isolated tributaries above Upper Fish Valley. During the summer of 1964, the Department of Fish and Game, realizing the seriousness of the situation, launched a program to restore the Piute trout to its former habitat. The hybridized trout population was then chemically eradicated and broodstock from the uncontaminated source were redistributed throughout the treated area.

Since it was determined that fewer than 200 adult Piute trout remained in Silver King Creek after treatment, the California Fish and Game Commission in 1965 declared an angling closure on Piute trout in Upper Fish Valley in hopes that the remaining broodstock could produce progeny which will eventually reestablish the fish throughout its former range. When the repopulation occurs, a carefully regulated open season may be possible. This will provide a novelty fishery for those anglers who are willing to "pack in" to catch a rare fish.

... California Department of ... were to be becoming increasingly concerned over the population ... of the more rare trout, Salmo clarkii seleniris of Silver King ... Lake, ... Lake County. This species of fish now exists in precarious ... waters with ... habitat environment having suffered considerably ... activities ...

Attempts have been made to transplant this unique fish into home water in Upper Silver Valley to other waters in the state. In all but two instances, the trout have failed to become established in new environments.

Fisheries biologists ... the ... feel that the Plute trout population ... is ... genetically ... hybridized ... Lahontan ... trout ... virtually extinct ... Lake ... to ... Lake ... to ... section ... extant ... reduced ... stream ... of this ... that ...

Until 1965, the ... were ... by ... mountain privately ... and ... stream ... trapped ... with ... by ... natural ... crossed ... Since this ... the ... marked ... from ... Upper ... to ...

During the ... the Plute trout became ... and ... with ... and ... plants ... Lake ... Lake ... Fortunately, ... were ... Plute trout ... found ... Lake ... Lake ... summer ... Lake, ... Lake, ... more ... the ... In ... Lake ... to ... Lake ... predicted ... from ... fulfilled ...

since ... In ... Lake ... Silver King ... Complaint ... Lake ... Fish ... which ... When ... possible. ... willing ... back ... Lake ...

In the future the greatest problem in maintaining a self sustaining Piute trout fishery will probably result from threats of environmental disturbance. Stream inudation by a power reservoir or damage from irrigation diversions, mining, pollution, road construction, logging, stream channelization, and residential construction activities could all destroy the special environment required by the Piute trout. Unfortunately, most of the habitat of the Piute trout is on privately owned land. Therefore, the fate of this species may be at the mercy of the land owner or developer.

The acquisition of 520 acres of land in Upper Fish Valley would place all of the natural range of the Piute trout in public ownership. This would give the Forest Service almost complete control over activities which would not be compatible with the preservation of the Piute trout. Controlled cattle grazing could be allowed to continue in Upper Fish Valley as it is not incompatible with habitat preservation. However, in some areas of Upper Fish Valley considerable bank sloughing and consequent erosion has been noted. Fencing of stream banks in problem areas would do much to correct this situation.

Complete prohibition of motorized vehicles in the Silver King Creek drainage upstream from the confluence of Corral Valley Creek would be very desirable and is strongly recommended.

In conclusion, we feel that the Piute trout is a threatened species and deserves the same degree of environment protection given to the Golden trout in Golden Trout Creek. A Piute trout preserve administered in a manner similar to the proposed Golden Trout Wild Area preserve would be a most desirable objective.

Eric R. Gerstung
Fishery Biologist II

January 21, 1965

in the future the greatest problem in maintaining a self sustaining
flute trout fishery will probably result from threats of environmental
disturbance. Stream inundation by a power reservoir or damage from
irrigation diversions, mining, pollution, road construction, logging,
stream channelization, and residential construction activities could
all destroy the special environment required by the flute trout. Unfor-
tunately, most of the habitat of the flute trout is on privately owned
land. Therefore, the future of flute fishes lies in the hands of the
land owners of America.

The acquisition of the upper Fish Valley would place
all of the natural ground in public ownership. This
would give the Forest Service almost complete control over activities
which would not be compatible with the preservation of the flute trout.
Controlled cattle grazing could be allowed to continue in Upper Fish
Valley as it is not incompatible with habitat preservation. However,
in some areas of Upper Fish Valley consideration and
consequent revision of Upper Fish Valley Planning of stream banks to problem
areas would be taken to correct this situation.

Complete prohibition of horse packers, hikers, fishermen
drainage upstream of the Golden Trout Wilderness Area in Golden Trout
very desirable and recommended.

In conclusion, we [illegible] flute trout is [illegible] species
and deserves the [illegible] environment protected [illegible] the
Golden Trout in Golden Trout Creek. A flute trout [illegible]
created in a manner similar to the proposed Golden Trout Wilderness Area
would be a most desirable objective.

[illegible] K. Gerstung
Fishery Biologist II

January 21, 1961

IV. WILDLIFE HABITAT - STREAM IMPROVEMENT

FOREST SERVICE, SAN FRANCISCO 11, CALIFORNIA

TO: Forest Supervisors, All Forests DATE: April 22, 1963

FROM: E. R. Doman, Assistant Regional Forester File No. 2630

SUBJECT: Wildlife Habitat - Stream Improvement

A meeting with Department of Fish and Game representatives was attended February 18 in Los Angeles to discuss the subject of fish habitat improvement, particularly as it applies to Southern California. The following persons were present:

Forest Service	Department of Fish & Game
Everett Doman	A. J. Calhoun
William Dasmann	John Janssen
A. E. Hall	Scott Seoul
T. D. Robinson	
Chas. Kennedy	

The Department had questioned Forest Service plans for stream improvement. It was pointed out at the meeting that the Department had recently terminated an extensive experimental program, in Southern California, involving construction of 780 structures of various types. These included log dams and deflectors, loose rock dams and deflectors, rock masonry dams and deflectors, rock masonry accelerators, and a splash board dam. The work was done between 1953 and 1957. A recent survey of the results of the project revealed that all types of structures had failed from one cause or another except about 25 percent of the accelerators. The conclusion drawn from the experimental program is that under Southern California conditions of unstable soils and occasional high velocity floods, only strongly built and carefully located accelerators can be expected to survive the high flows and heavy siltation to carry out their planned function.

The requirements for successful accelerators include: (1) the anchoring of a rather massive structure of sufficient length to prevent side cutting to a sound rock base, (2) location on grades of at least 1 percent with (3) stream flows of at least 5 c.f.s. for most of the year with absolute minimum of 2 c.f.s. during the fish planting season.

All were in agreement that such devices as log dams, accelerators, artificial cover, deflectors, etc., were a waste of money, in so far as fisheries improvement is concerned, in most California streams. Experience in this state and elsewhere indicates that generally these structures have not paid off in most cases, although there are occasional specific cases where one or another of such device may be worthwhile. In Southern California, however, where fishing waters are

FOREST SERVICE, San Francisco 11, California

TO: Forest Supervisors, Regional Foresters DATE: April 22, 1953

FROM: M. R. Doyen, Assistant Regional Forester File No. 2410

SUBJECT: Wildlife Habitat - Stream Improvement

Meeting with Department of Fish and Game representatives was attended February 16 in Los Angeles to discuss the subject of fish habitat improvement, particularly as it applies to Southern California. The following persons were present:

Forest Service	Department of Fish & Game
Everett Dressel	[illegible]
William Drennan	John Hosse
A. E. Hill	
I. [illegible] Rob Nash	
Chas. [illegible]	

The Department has [illegible] plans for fish improvement. It was pointed out [illegible] the Department and Service [illegible] to extensive [illegible] to further [illegible] involving construction of [illegible] various types. These include log dams and deflectors, [illegible] dams, and many others, [illegible] primarily [illegible] one of [illegible] necessary materials, [illegible] Several [illegible] been constructed [illegible] 1953 and the [illegible] effectiveness [illegible] type of [illegible] one of the criteria. The [illegible] constructed [illegible] under [illegible] stable conditions, [illegible] consistent high velocity [illegible] stable soils, [illegible] strong [illegible] and [illegible] considered [illegible] erated [illegible] expected [illegible] survive [illegible] [illegible] [illegible]

limited, angler density is very high, and the fish are largely planted at catchable size, well-engineered structures placed in very carefully chosen sites may provide more fishing water and allow more disirable distribution of anglers along streams. The Department requested, however, that improvement devices be confined mainly to larger, easily accessible streams that are presently on the stocking program. It is not desired to expand stocking to smaller streams or to poorly accessible portions of larger streams. The number of catchable trout produced and planted each year is limited to that for which trout stamp funds can pay. A high return of these expensive fish is essential. Fish are not planted in streams where at least 50 percent return is not achieved. The Department requested that care be taken not to encourage public demand for uneconomical plants in the smaller and/or less accessible waters. It was recognized, however, that there is a potential for improvement of harvest, utilization and natural production of some smaller streams, outside the stocking program waters, and that construction of devices in these situations, on a modest scale, could be worthwhile if coordinated between Department of Fish & Game and Forest Service.

The Department expressed approval and encouragement of soil and gully stabilization measures, barrier removal, log jam clearance, the thinning of dense streamside cover to allow foot passage and angling, and the fencing of streams to protect banks and channels from livestock. This class of improvements were considered definitely worthwhile.

V. COOPERATIVE RELATIONS: HABITAT MANAGEMENT
Endangered Species Toiyabe National Forest

U.S. FOREST SERVICE, SAN FRANCISCO, CALIFORNIA

TO: Files DATE: November 22, 1965

FROM: A. E. Hall, Jr., Regional Fisheries Biologist File No. 2610, 2630

SUBJECT: Cooperative Relations: Habitat Management
Endangered Spp. (Toiyabe N.F., R-4)

During the period August 30-September 2, 1965 I participated in a cooperative field survey of the primary range of the Piute cutthroat trout on the Alpine District of the Toiyabe N.F., R-4. The Piute (S.c. seleniris), a distinctive and geographically and genetically isolated, subspecies of the cutthroat trout (Salmo clarki), and closely related to the Lahontan cutthroat trout (S.c. henshawi) of the Intermountain and Great Basin country, is indigenous only to several small streams in the Fish Valley drainage of eastern Alpine County, California, a very limited range. Although some transplants have been made (notably to Cottonwood Creek in the White Mountains of the Inyo N.F., R-5) they have not been eminently successful. In the native range as well as the transplant areas there has been some question of genetic dilution and hybridization. Consequently considerable concern has arisen about the future of this recognized endangered species, and a program for its protection and expansion is under development. The Toiyabe, R-4 Headquarters at Ogden, and California Department of Fish and Game have been interested in the problem and recently began cooperative discussions and planning. The subject survey was the first on-the-ground examination, and was designed to develop field-level conclusions, determinations, and recommendations, and permit some additional transplanting operations as the second stage of a habitat rehabilitation effort in the headwaters areas. Emphasis was on habitat management from the National Forest standpoint, and the concept of a Piute Trout Wilderness Area was involved. We were invited to participate because of our involvement at Cottonwood Creek on the Inyo, and the location of the range in California. A list of the other participants is attached.

A good comprehensive examination of the major portions of the range, habitat conditions, and the status of the population was achieved. Transplanting operations from upper Silver King, Four-Mile Canyon, and Fly Canyon Creeks to Whitecliff Lake, upper Coral and Coyote Creeks were successfully accomplished. Considerable discussion of habitat management possibilities and the needs of the resource revolved basically around questions of control of recreational use and other land use activities in the area, and the need for full protection of the environment. The matter of the desirability of a formally constituted Piute Trout Wilderness Area as a means for achieving these objectives was a central item. It was the feeling of the Recreation

DATE: November 22, 1965

FROM: [illegible]

SUBJECT: Cooperative Relations: Habitat Manager and [illegible]
Endangered Spp. Toiyabe N.F., R-4

During the period August 30-September [illegible], I participated in a cooperative field survey of the primary range of the Pluto cutthroat trout on the Alpine District of the Toiyabe N.F., R-4. The Pluto trout (S.c. seleniris), a distinctive and geographically isolated, subspecies of the cutthroat trout (Salmo clarki), and closely related to the Lahontan cutthroat trout (S.c. henshawi) of the Lahontan Basin and Great Basin country, is indigenous only to several small streams in the High [illegible] range of eastern Alpine County, California, a very limited range. [illegible] have been made (notably in Cottonwood Creek in the Death Valley [illegible]) to establish [illegible] populations of the Pluto [illegible], R-3) that have not been profitable. Hatchery [illegible] is under way, and a program for [illegible] and expansion of [illegible] is considered desirable. [illegible] has arisen about the [illegible] of this program [illegible] genetic dilution and hybridization. [illegible] California F & G [illegible] and the Forest Service has been [illegible] the subject survey. [illegible] first [illegible] and [illegible] assigned to develop [illegible] conclusions, [illegible] recommendations, [illegible] additional [illegible] and [illegible] rehabilitation effort in the [illegible] habitat [illegible] from the National Forest [illegible]. [illegible] of a Pluto Trout [illegible] was [illegible] and [illegible] Cottonwood Creek [illegible] the Inyo, and the location of the [illegible] in California. [illegible] were [illegible].

[illegible] good cooperative exercise [illegible] habitat conditions, and the [illegible] [illegible] operations [illegible] and Fly Canyon Creeks to [illegible] [illegible] streams were successfully accomplished. [illegible] habitat management possibilities and [illegible] involved basically around questions of [illegible] other land use activities in the area, [illegible] of the environment. The matter of the desirability of [illegible] constituted quite a challenge [illegible] objective was a central item. [illegible] the Recreation

people, with some support from Fish and Game, that establishment of a Wilderness fully encompassing the native Piute range and incorporating adequate control of all possibly damaging uses, was essential. Several others, especially Dunham, expressed considerable doubt that this was necessary, desirable, or even practical. The position of this group was that better results could be obtained under adequate angling regulations and proper land use management. Problems of private land ownership are involved in this matter. It was the consenus of the biologists that little specific habitat improvement was necessary at this time, and that major effort should be directed to control of angling and other recreational use and the possibly competing grazing use in the meadows along Silver King Creek. It was felt the Forest and Department should keep a close watch on these matters and prevent the development of problems. The Toiyabe also plans to intensify efforts at ownership consolidation through exchange or purchase. The question of Wilderness Area establishment was tabled for continuing consideration.

I feel the trip was a profitable and successful one from all standpoints. Although all problems were not resolved some basic ones were, and considerable illumination was thrown on the whole subject. The coordination cooperation results achieved were noteworthy. The R-4 people emphatically agreed that inter-Regional contacts of this kind were highly desirable.

people, with some support from Fish and Game, that establishment of a wilderness fully encompassing the native Pinto range and incorporating adequate control of all possibly damaging uses, was essential. Several others, especially Burdam, expressed considerable doubt that this was necessary, desirable, or even practical. The position of this group was that better results could be obtained under adequate grazing regulations and proper land use management. Problems of private land ownership are involved in this matter. It was the consensus of the biologists that little specific benefit improvement was necessary at this time, and that major effort should be directed to control of grazing and other recreational use and the possibly competing grazing use in the meadows along Silver King Creek. It was felt the Forest and Department should keep a close watch on these matters and prevent the development of problems. The Forsyths also plan to intensify efforts at voluntary consolidation through exchange or purchase. The question of Wilderness Area establishment was tabled for continuing consideration.

I feel the trip was very profitable and successful one from all standpoints. Although all problems were not resolved some basic ones were, and considerable illumination was thrown on the whole subject. The coordination cooperation results achieved were noteworthy. The B-3 people emphatically agreed that inter-Regional contacts of this kind were highly desirable.

PARTICIPANTS

Piute Trout Field Survey, Toiyabe N.F., R-4, 8/30-9/2/65

George F. McGlaughlin - Deputy Supervisor, Toiyabe N.F.

Archie A. Murchie - Range & Wildlife Staff Officer, Toiyabe N.F.

Lyle F. Smith - Recreation and Lands Staff Officer, Toiyabe N.F.

Steve M. Rushton - District Ranger, Alpine District, Toiyabe N.F.

Andy Walker - Trail Foreman - Packer

Robert L. Prausa - Division of Recreation, R-4, Ogden

Donald K. Dunham - Regional Fisheries Biologist, R-4, Ogden

Leo Shapovalow - Senior Fisheries Biologist, Inland Fisheries, Calif. Department of Fish & Game.

George W. McCammon - Supervisory Fisheries Biologist, Water Projects, Department of Fish & Game

Richard D. Beland - In Charge, Endangered Fisheries Species Program, Department of Fish & Game

A. E. Hall, Jr. - Regional Fisheries Biologist, Region 5, San Francisco

VI. COMPARISON OF RAINBOW TROUT AND LAHONTAN CUTTHROAT TROUT

DEPARTMENT OF ZOOLOGY BERKELY, CALIFORNIA

April 2, 1964

Mr. Richard Beland
Region 11, Department of Fish & Game
1001 Jedsmith Drive
Sacramento, California

Dear Dick:

I'll try to give you a brief outline on the Piute trout which my provide some pertinent data for your records.

I have examined approximately 100 specimens of trout from Silver King Creek, both above and below the falls. I have comparative data on cutthroat and rainbow trout based on almost 2,000 specimens. On this basis, I have some confidence that my estimations on the relative values of certain characters to denote relationships and the effects of hybridization, approximates the true situation to some degree.

The Piute trout, S. c. seleniris, is typical of the Lahontan cutthroat trout, S. c. henshawi. The only valid distinction is the absence of spots on the body. I believe that the genetic basis governing the spotted or the spotless condition is slight. If a quantitative discrimination of genetic divergence could be performed, I would suspect that some long-isolated stocks of S. c. henshawi would show greater differences between each other than would seleniris to Carson River henshawi. Because, however, the character of a spotless body is such a striking and easily recognized character, it may be considered as a subspecies. The most pertinent differences separating the rainbow and cutthroat species are listed as follows:

Character	Rainbow	Cutthroat
Basibranchial teeth	absent	present (typically 2-13 in Piute trout, but often not appearing until specimen is about 100 mm).
Cutthroat mark	absent	present
Gillrakers	Typically 17-21; development of posterior rakers on first arch usually absent or much reduced	Same as rainbow except S. c. henshawi and S. c. selenir have 21-28 (typically 22-26). Posterior rakers well developed henshawi and seleniris.
Scales	Typically, 120-140 in laterial series, 25-30 above lateral line.	Typically, 150-180 in lateral series, 32-40 above lateral line
Pelvic fin rays	Typically 10	Typically 9

DEPARTMENT OF FISH AND GAME

April 2, 1994

Mr. Richard Taylor
Region III Department of Fish and Game
1001 Jedsmith Drive
Sacramento, California

Dear Dick:

I have examined the preliminary [illegible] you provide
creek, both above and below the falls [illegible] Silver King
cutthroat and rainbow trout based on abo[illegible] lengths. For this basis,
I have made certain [illegible]
certain characteristics [illegible] identification,
appendix A.

The [illegible] the spotted [illegible] of the
[illegible] the spotted [illegible] or the body.
[illegible] spotted [illegible] usually [illegible] the upper [illegible] and
[illegible] the [illegible] spotted [illegible] the [illegible] of the spot.
[illegible] the [illegible] spotted [illegible] the [illegible] of the spot
[illegible] spotted [illegible] the [illegible] of the spot.

Characteristic	Rainbow	Cutthroat	Silver King
Spots			
Cutthroat mark			
Gillrakers			
Scales			
Basibranchial teeth			
Vomerine teeth			
Pyloric caeca			
Coloration			

We may assume that the hybrids are fully fertile (and most evidence supports such an assumption) and that the above mentioned characters are governed by many genes, probably on many chromosomes so that we would not observe a simple, dominant and recessive effect but an intermediate condition between the parent species; thus, a relative estimate of the influence that rainbow hybridization has played in a cutthroat population can be made. An exception may be basi branchial teeth. The genes for no teeth (rainbow) seem to be dominant over the genes for teeth (cutthroat). Even after much backcrossing of a hybrid into a cutthroat population, and the resulting genotype becomes predominantly cutthroat, basibranchial teeth are often absent.

Keeping in mind that the few specimens making up the samples are probably not representative of the population as a whole, the following results were obtained:

Silver King Creek, above Llewellyn Falls. Seven of nine specimens have no spots on the body. Parr marks and general morphology suggests no contamination. All characters typical of seleniris. Two specimens have spots. One specimen has spots idential to S. c. henshawi, the other more obvious rainbow-like. Both specimens lack basibranchial teeth: The henshawi-like specimen has characters suggesting it has, perhaps, 1/4 - 1/8 or less rainbow heredity. Heavily spotted specimen from mouth of Bull Creek is also an undoubted hybrid. There is little doubt that rainbow trout have hybridized with the Piute trout above Llewellyn Falls. It would appear to be only a matter of time before a hybrid swarm is produced and the pure seleniris genotype becomes extinct here.

Coyote Valley. Nine specimens from above falls. Only two of these appear to represent seleniris. These two specimens have no spots on body, have basibranchial teeth and other characters typical of Piute trout. Seven specimens represent all degrees of hybridization as evidenced by spotting patterns and other characters. All these specimens lack basibranchial teeth. Coyote Valley sample indicates hybridization has been going on here for many generations.

Upper end Coyote Valley. Three specimens appear to be typical of Piute trout, or have only a slight rainbow influence. All have basibranchial teeth and other characters of seleniris except that the parr marks appear to be erratic. These specimens are poorly preserved and the unusual markings may be an artifact of preservation and handling. The upper end of Coyote Valley may have an isolated, pure strain of Piute. This should be investigated further.

Coral Valley. These three specimens are the most obvious hybrids. Although one specimen has 13 basibranchial teeth and is predominantly cutthroat, the other two are predominantly rainbow.

There is an indication that spotting is indicative of the amount of rainbow influence. All of the specimens, judged to be seleniris by appearance, have typical seleniris, maristic characters. Recognizable rainbow influence

April 2, 1964

Mr. R. Boland

could be detected in all spotted specimens, even if they had only a few spots. This is a hopeful indication that a nucleus for the propagation and preservation of a pure strain of seleniris could be had from selecting completely unspotted specimens. Each generation, however, that hybridization continues, the distribution of rainbow chromosones throughout the population will progress until all individuals will possess some rainbow influence and it will probably be impossible to salvage a pure Piute stock.

I am looking forward to the opportunity to accompany the expedition into Piute country this summer and to observe the effects of hybridization, myself.

Sincerely,

ROBERT J. BEHNKE
Zoologist

VII. CROOKED CREEK RESEARCH STATION WEATHER INFORMATION* (10,150)

Month	Average Temp. Max.	Min.	Average Inches Snow	Rain	Average Water Content
Jan.	31.7	9.1	14.5	0	1.36
Feb.	31.8	10.3	21.5	0	2.00
Mar.	33.4	11.4	12.6	0	1.09
Apr.	41.7	19.0	14.8	0	1.21
May	47.0	24.3	16.8	0.13	1.60
June	60.1	33.2	2.8	0	0.22
July	65.7	38.8	0.7	1.35	1.42
Aug.	64.7	37.4	0	0.63	0.63
Sept.	59.5	32.1	1.6	0.35	0.50
Oct.	49.4	24.2	6.6	0.06	0.60
Nov.	41.6	16.0	9.6	0	0.93
Dec.	36.4	12.2	11.4	0	0.98
Decade	46.9	22.3	112.9	2.52	12.54

BARCROFT RESEARCH STATION WEATHER INFORMATION* (12,470)

Month	Average Temp. Max.	Min.	Average Inches Snow	Rain	Average Water Content
Jan.	22.3	7.6	18.9	0	1.55
Feb.	21.8	6.5	19.3	0	1.78
Mar.	23.5	7.2	15.9	0	1.37
Apr.	30.5	13.2	17.4	0	1.48
May	34.4	18.4	27.5	0	2.44
June	46.5	30.4	4.7	0	0.44
July	53.4	36.7	2.7	1.19	1.42
Aug.	52.7	35.5	0.7	0.87	0.93
Sept.	47.8	30.7	5.5	0.15	0.72
Oct.	38.1	22.3	13.1	0	1.19
Nov.	31.6	15.7	12.1	0	1.16
Dec.	26.4	11.8	11.3	0	1.06
Decade	35.8	19.7	149.1	2.21	13.33

*Compiled by Dr. Nello Pace, White Mountain Research Project, from 1953 to 1963.

These two stations are within three miles of the Upper Cottonwood Basins and the data is analogous.

Month	Average Temp.		Average Inch.		Average Water Content
	Max.	Min.	Prec.	Rain	
Jan.	11.7	9.1	7.3	3	1.38
Feb.	11.9	1..	11.9	1	1.2
Mar.	13..	1..	12..	1	1..
Apr.	41..	1.0	14..	1	1.21
May	72.0	24.1	1 .	.13	1.60
Jun.	81..	31..	.	7	3.22
Jul.	79..	1.2	.		1.4
Aug.	7...	1..		.03	1.63
Sep.	7...	1.1	.	1.3	1.30
Oct.	6...	1...		1...	1.60
Nov.	.	.	.		.
Dec.	36..	12..	1.	0	0.52
Decade	65.9	12.3	110..	1.32	12.54

Month	Temp.		Average Inches		Average Water Content
	Max.	Min.	Prec.	Rain	
Jan.	.	.	.		1.33
Feb.	1..	.	.	0	1.2
Mar.	11.1	.	13.	3	1..
Apr.	30..	.	17..		1.6
May	74..	18.4	4..3	1	2.03
Jun.	8...	30.2	4.7	1.10	6.39
Jul.	73..	36.7	.	.	1.4
Aug.	72..	35.3	1.7	.	0.91
Sep.	.	.	.	.5	1.1
Oct.	5...	2...	.	1	1.1
Nov.	.	.	5..	.	.
Dec.	2...	1.8	11.1	.	1.20
Decade	35.9	1.9	140.1	2.21	13.39

Monitored by Dr. Nello Pace, White Mountain Research Project, from 1953 to 1963.

These two stations are within three miles of the Upper Cottonwood basins and the data is analogous.

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